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November 1988



Managing Competing and Unwanted Vegetation

Final Environmental Impact Statement

Summary



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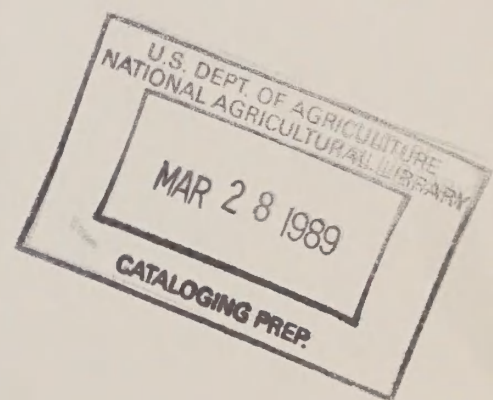


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Summary

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Introduction

A new program for managing competing and unwanted vegetation is being developed by the Pacific Northwest Region (Oregon and Washington) of the USDA Forest Service. This Environmental Impact Statement (EIS) replaces the 1981 Vegetation Management Environmental Impact Statement for the Region.

Competing and unwanted vegetation occur in all ecological systems. Unwanted vegetation may include logging slash, roadside brush, or plants which compete for nutrients and sunlight with more desirable species. These plants play various roles in the system, some of which are useful to society. Forest managers recognize that an understanding of the overall ecological system is key to the effective management of unwanted vegetation.

To that end, a Final Environmental Impact Statement for Managing Competing and Unwanted Vegetation has been prepared by the Forest Service. The decisions that will be made based on this Final EIS will guide management on all National Forests in Oregon and Washington. They will provide information and policies that will be considered in preparation of Land and Resource Management Plans for each National Forest.

This summary highlights the major points of the Final EIS. It contains a brief description of the purpose of, and need for, an Environmental Impact Statement; an explanation of vegetation management; a description of public involvement in the decision-making process; a comparison of the alternatives; and a summary of the details of the recommended alternative.

The summary is only an overview of the Final EIS. Many of you will want more information concerning this far-reaching decision. The complete EIS includes:

Summary: an overview of the final EIS;

Chapter I: an introduction to vegetation management, the public and management issues surrounding it, "the NEPA process", and other considerations;

Chapter II: the presentation and comparison of the alternatives, with information on how they would be implemented, including measures to protect the environment;

Chapter III: descriptions of the physical and biological setting of the Pacific Northwest Region; and

Chapter IV: changes likely to occur with implementation of any of the alternatives.

Detailed supporting and background information is presented in 12 appendices:

- A Timber Growth and Yield Analysis
- B Economic Efficiency Analysis
- C Herbicide Use and Efficacy
- D Human Health Risk Assessment (Quantitative)
- E Silviculture Program Effects
- F Rangelands of the Pacific Northwest Region
- G Vegetation Management Activities
- H Resource Programs and Human Health Risk Assessment (Qualitative)
- I Public Participation and Consultation
- J Wildlife Use of Six Broad Forest Types
- K Method Used to Project Particulate Emissions from Prescribed Burning

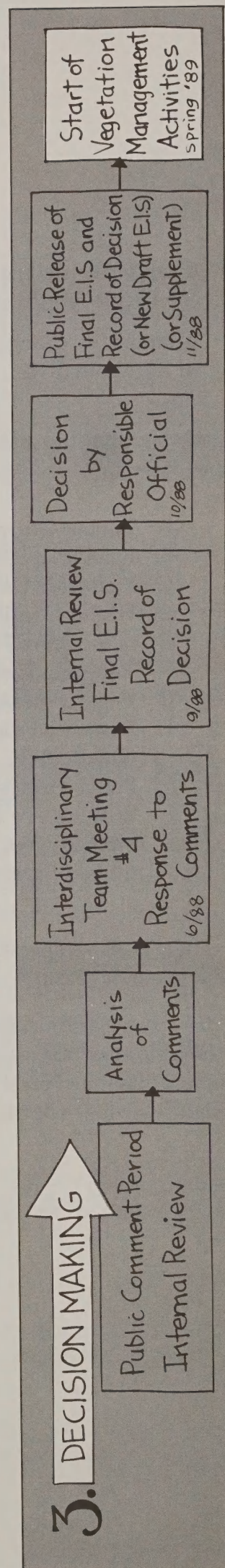
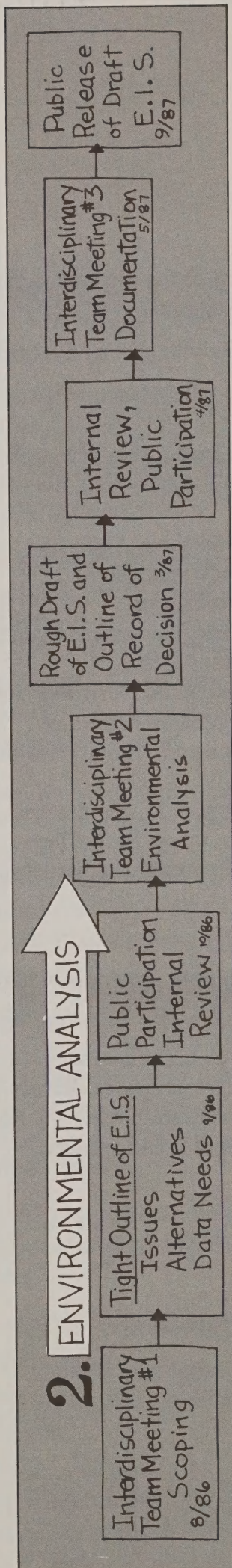
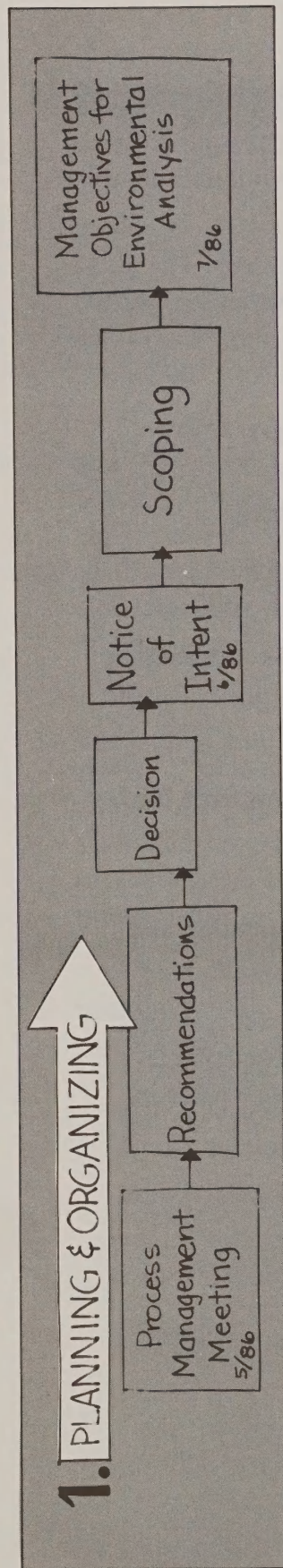
There is also a special separate appendix, Characterization and Management of Risk.

To receive a complete final copy, contact your nearest National Forest head-quarters office. The names, addresses, and telephone numbers of all the Forest headquarters (and the Regional Office in Portland) are listed at the end of this summary.



Pacific Northwest Region
Vegetation Management
Environmental Impact Statement

The Process



Summary

The Pacific Northwest Region of the USDA Forest Service is headquartered in Portland, Oregon. It includes Oregon, Washington, and parts of a few counties in California and Idaho. In this Region, the Forest Service administers 19 National Forests (including one National Grassland) totalling 24.5 million acres.

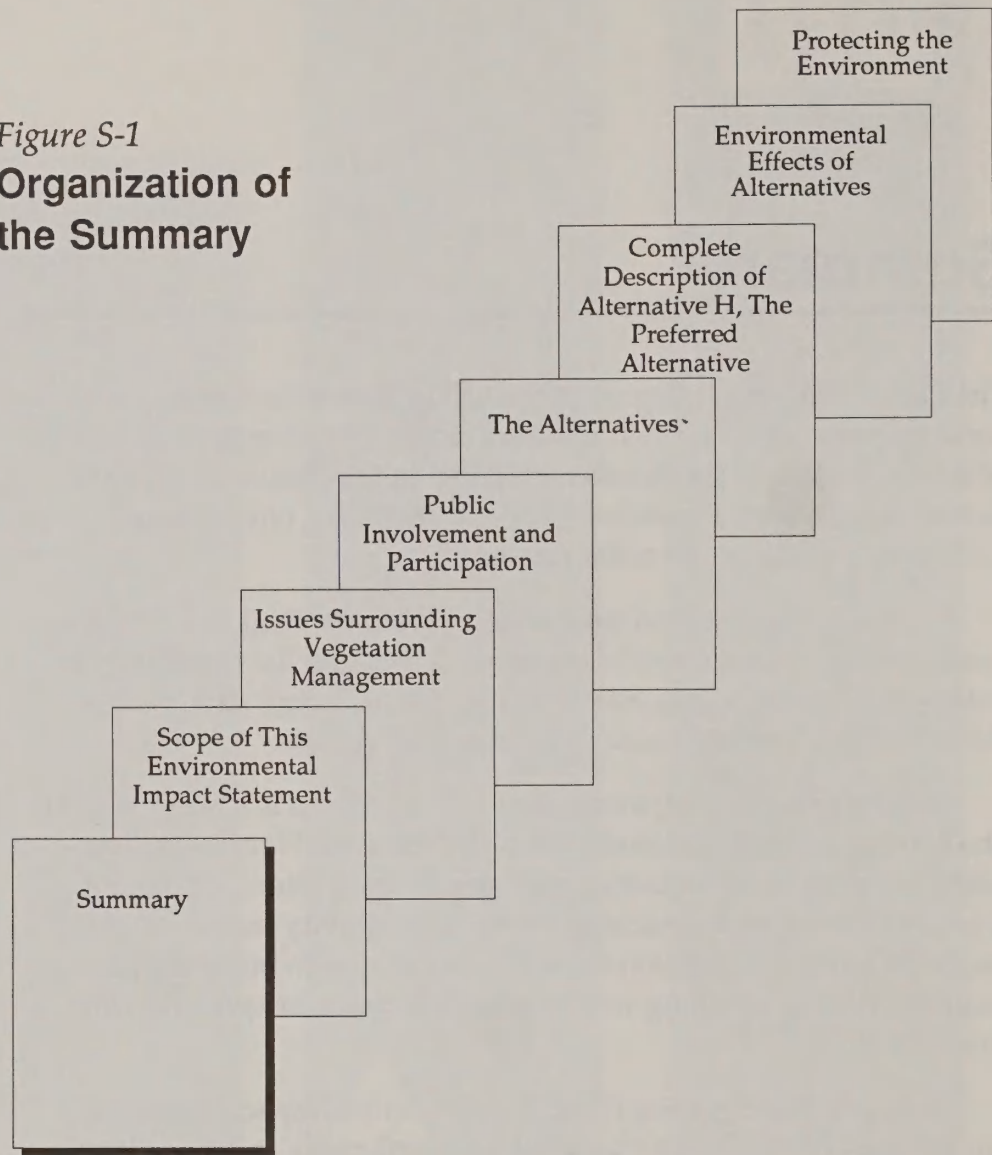
Terrain and vegetation vary widely across the Region. There is a great variety of landforms from coastal dunes and flat grasslands to rolling hills, steep ridges, and volcanos. Natural vegetation ranges from the Olympic rain forest to interior high deserts.

Managing competing and unwanted vegetation is a major effort in the management of National Forests in the Pacific Northwest. The effort involves many activities such as preparing sites for planting trees or clearing away roadside brush. Each activity uses different methods to treat vegetation including burning with prescribed fire, cutting by hand, crushing with heavy equipment, or spraying with herbicides.

Decisions based on the Final Environmental Impact Statement could affect future Forest Plans. Both existing plans and those being prepared assume that all methods of managing competing and unwanted vegetation are available. If the new vegetation management program would significantly change decisions made on the way lands and resources would be managed on a National Forest, then the Forest Plans will be amended as needed.

Information in this summary is arranged as follows:

Figure S-1
**Organization of
the Summary**



Scope Of This Final Environmental Impact Statement

At the end of the environmental analysis process documented in both the Draft and Final Environmental Impact Statements, the Regional Forester will select a program for managing vegetation. This program affects all National Forest activities involving the management of competing and unwanted vegetation, including logging residue (slash) that is managed for purposes of reforestation. These activities include:

- preparing sites for planting trees;
- releasing young conifers from competing vegetation;
- managing fuel hazards and preventing wildfires;
- improving range conditions for livestock;
- controlling noxious weeds;
- improving wildlife habitat;
- maintaining recreation and administrative facilities;
- maintaining roadsides and utility corridors; and
- supporting the tree genetics and research programs.

Many of the items listed are major activities involving a variety of actions and tasks. Only the portions of each activity that involve managing competing and unwanted vegetation are affected by decisions made as a result of this Final EIS. Activities in Forest Service tree nurseries are not included.

Methods of vegetation management considered here include the use of herbicides, prescribed burning, manual work, biological treatments, and mechanical means.

Efforts to control or eradicate unwanted vegetation may significantly affect the natural and human environment. The purpose of an environmental impact statement such as this is to examine those impacts.

In an environmental analysis, issues play a substantial role in forming the alternatives, raising questions for analysis, and focusing thought and discussion when selecting the preferred alternative.

The following seven issues were distilled from the comments of individual citizens, elected officials, interested groups, government agencies, and Forest Service employees. These people participated in early public involvement efforts that provided information about issues this environmental impact statement should address, and about ways the public could be involved throughout the whole analysis process. They include:

Human Health

Human health issues have been a major focus of controversy over vegetation management practices in recent years. Much attention has centered on the safety of using herbicides for vegetation control. The effects of smoke from prescribed burning has also emerged as an important health issue, along with the need to evaluate the health and safety effects of manual methods for managing vegetation.

Public Participation

Public participation is an important element of a successful program for managing public lands and natural resources. Public participation in vegetation management decision-making is an especially important and sensitive issue because of past conflict-charged relations. Members of the public asked to be (and were) included throughout the development of these Draft and Final Environmental Impact Statements.

Issues Surrounding Vegetation Management

They also asked for continuing participation and information sharing after the decision has been made, for participation in site-specific, project level planning, and for readable, clear analyses and documents. Public participation played a very important role in the development of this Final EIS. More detail follows in a separate section of this summary, with complete information in the EIS itself. Responses to public comments on the Draft EIS are contained in Appendix I.

Social and Economic Effects

Vegetation management activities have direct effects on employment and the quality of community life. The vegetation management program influences how much timber the Region can grow and harvest. The quality of grazing, water, recreation, and wildlife habitat may also be affected. These Forest activities support jobs directly and indirectly in many sectors of the economy. The program chosen will have economic effects as well as effects on the general well-being of communities.

Cost and Benefit Analysis

National Forests offer a wide range of goods and services. Some of those goods and services are sold or leased; others are provided at no fee. It also takes money, people, and resources to manage the Forests. The concern in this issue is that money and resources be wisely managed and put to the most effective and beneficial use.

Environmental Effects

All facets of the environment contribute to providing products such as quality air, water, and timber. To produce a continuing supply of these and other benefits, the ecosystem must remain healthy. There is concern both by the public and the Forest Service about the physical and biological effects of vegetation management techniques on the environment.

Effectiveness of Techniques

There are many different vegetation management techniques and many different site characteristics and conditions. It is important to match the appropriate technique to the circumstances and particular site. Sharing knowledge of current techniques, products, and technology is an important aspect of this match. In addition, measures must be taken to assure that desired results are being achieved.

Interagency Coordination

Agencies at all levels of government have a shared interest in vegetation management. Many agencies have vegetation management

responsibilities which overlap those of the Forest Service. These may be directly or indirectly affected by decisions made as the result of an environmental analysis. Coordination with national, state, and local agencies is important in developing a program for vegetation management.

From the beginning of this environmental analysis, the public has been involved. Public participation led to the identification of the issues we dealt with throughout the process. The Draft EIS was submitted to the public for review and comment in October, 1987. The comment period ended February 15, 1988.

About 4,900 responses were received from 29 states. Of these, 3,500 were "form letters" and the remainder were individually written. The vast majority of them were from Oregon (4,100) and Washington (600). Letters came from individuals and families, environmental groups, timber industry businesses, associations and unions, county and state elected officials, businesses or business groups, city, state, and federal agencies, and civic groups, among others.

The next step in the process was content analysis. This is a process where each response is read to identify the key points made. Then this content is coded, and similar comments are grouped together. A coding team worked nearly three weeks reading and coding letters. The coded comments were entered into a computer which stores the information for sorting and tabulation. The comments were evaluated by the Vegetation Management Team, and recommendations were developed for responding to the issues raised. (See Appendix I for more information.)

Seven alternative combinations for managing competing and unwanted vegetation were presented for review in the Draft EIS. Based on the comments received, the team formulated a new alternative for recommendation to the Regional Forester. The highlights of new Alternative H are included (along with the descriptions of the original seven alternatives) in the next section of the summary. A full description of Alternative H follows next after brief explanations of all the alternatives and the environmental effects.

Public Involvement and Participation

Public Response to the Draft Environmental Impact Statement

Analysis of Responses

One Result: a New Alternative

Figure S-2

Overview of the Alternatives

Alternatives	A	B	C	D
Manages Competing and Unwanted Vegetation	...with no herbicides.	...with all effective tools.	...rarely, and only for human safety.	...emphasizing prevention and the use of natural processes.
Time for Action	At first sign before damage occurs	At first sign before damage occurs.	No action unless vegetation threatens public safety.	At first clear sign of potentially significant damage.
Project Design	*Prevention and correction both o.k.; herbicides will not be used.	Prevention and correction both o.k.; all tools and methods available.	Correction only; fire and herbicides both prohibited.	Prevention is preferred; herbicides available as a last option.

* "Prevention" and "correction" are two strategies for managing vegetation.
Successful prevention keeps vegetation problems from getting to the point where they require correction.

** Forest Service preferred alternative..

E	F	G	H **
...with restricted use of herbicides and special worker safety.	...with no burning for silviculture.	...aggressively, with all tools.	...with all tools. Non-herbicide methods preferred. Using special herbicides requires special consideration.
At first sign, before significant damage occurs.	At first sign, before damage occurs.	At first sign, before damage occurs.	Evaluate early stages of main project. Act when evidence suggests growth loss or significant damage will occur.
Prevention is preferred; some herbicides prohibited, no aerial application; manual use restricted.	Prevention and correction o.k.; fire will not be used to prepare planting sites.	Prevention and correction o.k.; all tools and methods freely available.	Prevention is emphasized. Reduce reliance on herbicides, and on prescribed fire for treatment of slash. Three herbicides prohibited.

The Alternatives *Alternative A*

This alternative is designed to eliminate all risk associated with the use of herbicides. Other effective and efficient techniques would be used in managing competing and unwanted vegetation.

In compliance with a 1984 U.S. District Court injunction, the Forest Service in the Pacific Northwest currently cannot use herbicides. Alternative A approximates this current vegetation management program carried into the future.

Alternative B

Under Alternative B, all effective and efficient techniques for managing competing and unwanted vegetation are available, consistent with the direction provided in applicable land and resource management plans.

The management of competing and unwanted vegetation specified in this alternative approximates the direction presented in proposed Forest Plans. Alternative B and the fiscal year 1989 program serve as the reference for comparison of budgets, outputs, and vegetation management activities for all other alternatives.

Alternative C

The vegetation management approach here is one of "no action" unless public safety is clearly and directly threatened. For example, hazard trees would be removed from campgrounds and roadside brushing would be done to maintain safe travel, but virtually none of the vegetation management normally associated with forest management would be done.

There is virtually no active intervention to manage competing and unwanted vegetation in Alternative C. Only situations that pose a direct threat to public safety will trigger action to suppress unwanted vegetation. In these cases, neither herbicides nor fire would be used.

Alternative D

The key to this alternative is the prevention of problem vegetation conditions through the integration of natural ecosystem processes into management of competing and unwanted vegetation. In Alternative D, vegetation management emphasizes leaving the least negative impact on the natural environment while producing products and amenities for human use.

The implementation of this alternative will involve early prevention measures, monitoring of sites, and frequent evaluations of conditions and practices. Vegetation is managed to avoid the need for corrective measures. However, correction, if needed, is done in a way to least alter natural ecosystems and processes.

Alternative E

This alternative is designed to reduce the risks of herbicide use to people and to improve the safety of forest workers when they apply herbicides and cut vegetation. No aerial application of herbicides is permitted, specific herbicides are prohibited, and additional safety requirements for workers are imposed.

Alternative F

This alternative is designed to manage competing and unwanted vegetation without the use of prescribed fire for silvicultural purposes. All other effective and efficient techniques of vegetation management are available. The burning of logging slash would be allowed for reducing wildfire hazards. Residue utilization is encouraged in place of burning, and burning of chemically treated vegetation is prohibited.

Alternative G

This Alternative manages competing and unwanted vegetation more aggressively than Alternative B. The emphasis is on maximum production of all forest resources for human use. All cost-efficient techniques for managing vegetation are available. It stresses looking for opportunities to increase timber and forage production (through vegetation management) beyond that predicted by the Forest Plans.

Alternative H (the Preferred Alternative)

This alternative combines a number of features of the seven original alternatives. Under Alternative H, we will manage vegetation with all tools, while reducing the reliance on herbicides, and on prescribed burning for reforestation purposes. Herbicides and prescribed burning will be used only when other methods would not be effective or when their costs would be unreasonable. Vegetation treated with herbicides will not be burned for at least one year following application. Outputs of forest commodities will approximate those of the applicable land and resource management plans.

Figure S-3

Activity and Implications by Alternative

Alternative	A	B	C
Acres managed annually for competing and unwanted vegetation:			
Total	552,100	553,000	86,600
Using herbicides	0	59,900	0
Using mechanical methods	184,600	167,200	44,900
Using manual methods	99,000	77,800	17,700
Using biological methods	14,800	4,300	3,800
Using prescribed fire	217,800	202,000	0
Receiving no treatment	24,400	19,900	15,600
Other	11,500	14,100	4,800
Anticipated Number of Worker Accidents Per Year (from combined use of manual methods and prescribed burning, by alternative):			
Minor injuries	1,250	1,053	189
Major injuries	30	29	3
Emissions from Prescribed Fires (Change from 1983-85):			
West-side	36% less	33% less	no burning for veg. management
East-side	33% less	35% less	
Long-Term Sustained Yield Capacity: (Change from Alt. B in million board feet)			
	95 to 125 less	0	1,000-2,000 less
Present Net Value: (Change from Alt. B in million dollars)			
	468 less	0	3,877 lower
Change in Jobs: (Change from Alt. B)			
	1,100 fewer	0	21,700 fewer

Unit definitions, data sources, and assumptions discussed in preceding text.

D**E****F****G****H**

380,500	548,600	566,400	579,600	543,248
26,800	47,900	64,100	76,600	51,492
111,600	166,900	201,000	155,600	162,018
57,800	95,100	80,100	85,700	79,658
18,700	5,900	8,300	6,900	7,445
125,800	194,000	175,800	202,000	202,017
23,800	24,100	36,100	21,500	31,770
16,000	14,700	11,000	18,300	8,848

741	1,152	1,004	1,126	1,017
19	27	25	30	26

63% less	46% less	63% less	35% less	63% less
60% less	37% less	53% less	31% less	60% less

55-85 less	35-65 less	95-125 less	95-125 more	0
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246 less	132 lower	322 lower	24 higher	4 less
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3,100 fewer	1,300 fewer	3,100 fewer	2,600 more	500 fewer
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Figure S-4

How Alternatives Respond to Issues



Issues	Unit of Measure	Alternatives	
Human Health	Qualitative risk assessment	Eliminates risk from herbicides. Increased risk from other methods.	Historical risk pattern continues.
Public Participation	Guidelines for project planning	Same as Alternative B	Interested public informed and involved in vegetation management.
Social & Economic Effects			
—Change in payments to local governments	Million \$ per year	-3.0	Reference*** (209.2)
—Change in personal income	Million \$ per year	-22	Reference*** (22,100,000.00)
—Change in jobs	Number of jobs	-900	Reference*** (90,500)
—Predicted change in LTSYC* capacity (over full rotation)	% Change Million Board Feet	-5% -190 to 215	Reference*** — (4 billion)
Cost/Benefit Analysis			
—Change in Present Net Value	Million \$	-597	Reference*** (11.6)
—Change in Forest Service Budget	Million \$	+1	Reference*** Base: (0)
Environmental Effects			
—Long-term productivity (change)	Biomass Production	Same as Alternative B	Continuation of current conditions, as modified by applicable land and resource management plans.
—Air quality (All alternatives meet state TSP** reduction goals by the year 2000.)	Reduction of TSP emissions from current levels by the year 2000	West-side levels reduced by 36% East-side levels reduced by 35%	West-side levels reduced by 33%; East-side levels reduced by 35%
Effectiveness of Techniques	Quality of tree establishment and early growth (Commercial species)	Some problems in tanoak-madrone, ceanothus spp. and herbaceous veg., leading to tree mortality and growth loss in new plantations.	Continuation of current techniques (with herbicides restored to use).
Interagency Coordination	Guidelines for project planning	Same as Alternative B	Coordination with state and local agencies required in project design.

* LTSYC: Long-Term Sustained Yield Capacity (for timber production). This is the average for all 19 National Forests. The change will be much greater on some forests; less on others. The annual timber sale quantity will be determined in individual Forest Plans. See Chapter IV.

**TSP: Total Suspended Particulates (smoke).

*** Reference: Level expected with the implementation of the Forest Plan.

C	D	E	F	G	H
Little risk from managing vegetation. Some increased risk from noxious weeds and travel accidents.	Risk decreases through prevention.	Risk to public reduced. Risks to workers near current levels, despite extra safety measures.	Risks from fire and smoke reduced. Increase in herbicide use.	Risk to public and workers increases because of more treatment.	Risk decreases through prevention. Risks from fire and smoke caused by slash burning reduced. Reduced reliance on herbicides.
Involvement infrequent due to few projects.	As in Alternative B, with increased emphasis is on early involvement through to project implementation.	Same as alternative B	Same as Alternative B	Same as Alternative B	Emphasis on early involvement through project implementation and monitoring.
-43.4	-2.9	-2.4	-5.2	+1.6	-1
-432	-42	-19	-63	+15	-11
-17,700	-1,800	-800	-2,600	+600	-500
-25 to 50%	-1-1/2 to 2%	-1 to 1/2 %	-2- 1/2 to 3%	+2-1/2 to 3-1/2 %	0
-1,000 to 2,000	-55 to 85	-35 to 65	-95 to 125	+95 to 125	0
-2,783	+141	-39	-455	+222	-4
-109	-17	-7	-8	+1	-3
Substantial loss; fire increases above current and natural levels, reesults in soil damage.	Slight increase from leaving biomass on site, fire risk managed, nutrient availability will increase.	Same as Alternative B	Same as Alternative B	Slight decrease. Aggressive control and residue use results in less biomass, nutrients on site. Less mechanical and fire damage to soils.	Increase from leaving biomass on site; slash burning reduced; nutrient availability will increase.
No burning for silviculture; but substantial increases in wildfire and smoke.	West-side levels reduced by 63%; East-side levels by 60%.	West-side levels reduced by 46%; East-side levels by 37%.	West-side levels reduced by 63%; East-side levels by 53%.	West-side levels reduced by 35%; East-side levels by 31%.	West-side levels reduced by 63%; East-side levels by 60%.
No vegetation management.	Minor reduction in effectiveness on some existing problem sites; future techniques will draw on experience with preventive measures, effectiveness will be near current levels.	Effectiveness reduced in dense vegetation and steep terrain.	Effectiveness reduced in plantations with large amounts of competing vegetation or logging residue.	Some marginally suitable land will come under management. Stocking levels will increase in some areas.	Some minor reductions in effectiveness on dense vegetation and steep terrain. Future techniques will draw on experience with preventive measures. Use of corrective measures will incorporate designs meant to move towards more preventive strategies.
Little coordination, as no management of most competing and unwanted vegetation.	Same as Alternative B	Same as Alternative B	Same as Alternative B	Same as Alternative B	Early coordination with state and local agencies required through project design, implementation, and monitoring phases.

Environmental Effects of Alternatives

The analysis focuses on five methods of managing competing and unwanted vegetation (use of herbicides; mechanical; manual; biological, cultural and grazing; and prescribed fire) to examine their effects on the environment. The analysis shows that at the project level, each method of managing competing and unwanted vegetation has its own environmental effects. However, mitigation measures have been established for each method to prevent serious negative environmental effects. Therefore, no single method is expected to cause more environmental impacts than another.

Because this environmental impact statement examines alternative programs for managing competing and unwanted vegetation, it is also concerned with how a series of projects conducted over a period of years could affect the environment. From this program point of view, there are three sources for potential environmental effects:

- human health risks from using or not using herbicides;
- air pollution from prescribed fires; and
- economic effects from variations in timber production between the alternatives.

Since each alternative was constructed to respond to a different issue, each has its own set of environmental effects. The analysis of each alternative addresses the effects of different methods of vegetation management on the physical, biological, social, and economic components of the environment.

Mitigation measures were also developed to prevent adverse environmental impacts. (The specific effects of individual projects are not assessed in this Final EIS because they will be addressed at the local level in site-specific environmental analyses.)

Chapter IV in the Final Environmental Impact Statement presents the environmental consequences in detail. Chapter II contains a complete description of all alternatives along with a detailed comparison of them in terms of issues. The preceding Figure S-4 presents a summary of the major elements of that comparison.

**Complete
Description of
Alternative H, the
Preferred
Alternative**

Purpose and Theme

The purpose of this alternative is to conduct a Regional vegetation management program so that it: 1) protects human health; 2) promotes long-term health and productivity of forest ecosystems; and 3) meets the goals and objectives of land management plans.

The theme here is to reduce the reliance on herbicides, to continue to reduce the use of fire for treating slash, and to support providing goods and services at high levels.

To achieve its purposes and theme, this alternative emphasizes preventing vegetation management problems. All methods for managing competing and unwanted vegetation will be available. Protecting rural communities and wildernesses from the deleterious effects of smoke is a high priority. This alternative also requires early involvement of the public to help set project goals, conduct environmental analysis, observe project implementation, and to monitor the results of projects.

Time for Action

The intent of this alternative is to detect and resolve vegetation management problems before they cause serious losses or require large correction projects. This calls for evaluating the need for action when problems are expected. The evaluation should include site-specific surveys and documented local experience. Then, when the evaluations verify that the expected problems are likely to occur, action will be taken. This approach will help managers to detect and control vegetation problems before they cause damage.

At times, results of the evaluation may be inconclusive and managers won't be sure that serious damage will occur. Managers may then elect to defer action until it is clear that a problem is developing. In some cases, waiting may reveal that the damage is minimal and that further action is not needed.

Project Design

The factors to consider in designing projects include:

Strategy: This approach emphasizes the use of prevention and natural processes to manage competing and unwanted vegetation. It requires creative solutions that use the biological and technical knowledge gained through monitoring. Managers will need to anticipate potential vegetation management problems and take steps to avoid them. When corrective measures are needed, those projects should be designed to move toward preventive strategies.

The planning stage for any project (such as timber harvest, road construction, or range improvement) is the most appropriate time for implementing a prevention strategy. For example, the site analysis may identify a plant association known for its potential to compete with crop trees. A harvest prescription may then include measures to limit the vigor of competing vegetation, be designed to reduce the need for subsequent corrective action (in this case, release), and result in lower overall costs.

Human Health Risks: The evaluation of human health risks, including exposure to hazardous substances and injuries, is an important factor in designing projects and in selecting vegetation management methods. All methods that are being considered will be analyzed prior to use for potential direct and indirect effects on human health. Herbicides and prescribed fire for slash treatment will be used only when necessary. Selected methods will present low risk when compared to other methods that could also meet the design criteria.

The protection of recreational and rural residential populations from exposure to smoke from forestry burning will be given special attention. All practicable means of smoke management (reduction, avoidance, and scheduling) will be employed.

Environmental Effects: Adverse effects will be minimized by using 1) site-specific environmental assessments, 2) mitigation measures described in this EIS, and 3) natural processes. The site-specific environmental assessments will address potential environmental effects for proposed projects. They will also help identify project designs and mitigation measures that will be necessary to minimize adverse effects. The diversity and integrity of the natural ecosystem and long-term productivity are major considerations in this process.

Tools Available: This alternative makes all tools available while at the same time working toward the goal of reducing reliance on herbicides. Using herbicides requires special considerations to establish their need, assess the risks, and to implement special mitigation measures. Herbicides will be used only when necessary; that is, when other methods would not be practicable or when their costs would be unreasonable. As a part of the site-specific NEPA process, the responsible officials will document the criteria they used in establishing the need for using herbicides.

Vegetation that has been treated with herbicides within the prior year will not be burned, and utilizing management activity-generated residues is preferred to burning. However, prescribed burning is avail-

able since it is often the preferred method for reducing the natural accumulation of dead plant debris, maintaining ecosystems at a more productive stage of succession, and regenerating decadent, fire-dependent plant communities.

Two of the herbicides evaluated for use, diuron and fosamine, had insufficient data to support toxicological analysis. A third herbicide, amitrole, poses unacceptable cancer risks under normal exposure scenarios. None of the three herbicides will be used under this alternative.

The use of all tools and methods requires operator safety training and proper protective gear. The Forest Service will coordinate vegetation management activities with its neighbors. In addition, all contracts will provide for worker education and safety (including the use of protective clothing) at a level equivalent to that specified for Forest Service employees.

Forest managers will continue to evaluate and monitor tools and intensity of application. Methods used will continue to change based on new research, analysis of completed projects, improvements in technology, and public need.

Budget and Costs: The costs of the activities will vary, but will be within the budgets that can be reasonably expected. In selecting vegetation management methods for projects, human health risks, environmental effects, project-specific decision criteria, and cost-efficiency will be considered .

Outputs: Vegetation management activities will be those required to support the production of forest goods and services at a level approximating those of the applicable land and resource management plans.

Protecting the Environment

As an integral part of developing the Draft EIS, mitigation measures were developed to reduce, avoid, or minimize potentially adverse impacts on the environment which might result from vegetation management activities.

The mitigation measures were developed using Federal laws and regulations, the intent of state resource laws, existing direction found in Forest Service manuals and handbooks, land and resource management plans, resource management experience, and research findings.

Several mitigation measures cover all vegetation management activities, regardless of method. Others apply to a particular method. If a

method is used in an alternative, the mitigating measures associated with that method will be applied.

What follows is a summary of the mitigation measures that were developed. For more information, refer to Mitigation Measures and Vegetation Management Methods in Chapter II of the Final Environmental Impact Statement. Additional information on the effectiveness and impacts of mitigation measures is in Chapter IV, Environmental Consequences.

Mitigation Measures

Before using any method of vegetation management, Forest Service personnel will be required to:

- conduct an environmental analysis (including scoping) as required in Forest Service Manual 1950, for each proposed project;
- prepare a human health risk management plan for each project; and
- provide training and quality control at regional, forest, and district offices.

The mitigation measures that apply to all silvicultural vegetation management require:

- a written silvicultural prescription prepared or approved by a certified silviculturist; and
- a site-specific diagnosis that meets Forest Service Silvicultural Practices Handbook (2409.17) standards and treatment needs (2409.26c).

Biological Methods: When using livestock to control vegetation, the Forest Service will notify affected water users, and assure strict control of livestock near riparian areas. The release of insects to control specific vegetation requires coordination with state and Federal agencies. Site analysis will explore the seeding of compatible plants and the use of genetically superior seedlings, natural seedlings, and advance regeneration as ways to prevent or minimize the need for future vegetation management.

Manual Methods: When workers with hand and power tools are used to treat vegetation, safety risks will be analyzed and incorporated into the human health risk management plan.

Mechanical Methods: When mechanical methods of treating unwanted vegetation and logging residues are used, tractors will not be

used on steep slopes, on highly compactible soils, on erodible soils in municipal watersheds, or during conditions with high risks to soils. Buffers of vegetation will be left along streams, lakes, and wetlands to minimize sedimentation. Logging residue will not be piled in stream flood plains.

Use of Herbicides: Some of the alternatives would allow use of herbicides; some would not. If herbicides are used, there will be strict adherence to:

- EPA label instructions for the herbicide;
- applicable state and Federal laws; and
- site-specific mitigation measures.

If herbicides are used, these specific measures will be implemented:

- downstream water users and adjacent landowners will be notified of planned use of herbicides;
- amitrole, diuron, and fosamine will not be used in the Region's vegetation management program;
- dalapon will not be used in roadside vegetation management nor in any other situation where its use could result in exposure to the public, either through routine operations or accidents;
- female workers (either Forest Service employees or contract workers) will not be used as mixers or loaders in atrazine or bromacil applications;
- female workers will not be used in backpack spray or hack-and-squirt applications for 2,4-D, glyphosate, dicamba, tebuthiuron, triclopyr, simazine, and bromacil;
- female workers will not be used in dalapon applications;
- atrazine will not be applied aerially;
- diesel oil will not be used in herbicide applications except as an adjuvant (not to exceed 5 percent of the spray mixture);
- kerosene will not be used in herbicide applications, except as an inert ingredient in the ester formulation of triclopyr;
- use herbicide formulations that contain only inert ingredients which are recognized as generally safe by EPA or which are of a low priority for testing by EPA. Use of other inerts (identified by

EPA as a high priority for testing or those that have been shown to be hazardous) requires full assessment of human health risks incorporated into the NEPA decision-making process;

- precautions against accidental leaks or spills will be taken;
- mixtures will be prepared and equipment will be cleaned in areas outside sensitive watersheds, where ground water will not be contaminated;
- protective clothing will be worn by all workers (both Forest Service employees and contract workers) involved in herbicide mixing, loading, backpack applications, and hack-and-squirt applications;
- public notification will be used for all applications requesting that people who know or suspect that they are hypersensitive to herbicides contact the Forest Service office proposing the project to determine appropriate risk management measures;
- workers (both Forest Service and contract) who know they are hypersensitive to herbicides will not be used for application projects. Workers who display symptoms of hypersensitivity to herbicides during application will be removed from the project;
- spray droplet size will be optimized to minimize drift;
- specified buffers will be left along streams, rivers, lakes, and wetlands;
- pilot vehicles will be used when transporting mixed herbicides (see Chapter II, Mitigation Measures);
- both worker and public exposure monitoring is required for all herbicide application projects. Pertinent details will be documented, including herbicides used, land areas treated, dates and times of applications, people involved and mitigation measures followed; and
- monitoring will be done to assure effectiveness of mitigation measures during spray operations.

Herbicide use will be in compliance with Forest Service Pesticide Use Manual (FSM 2150) direction. Forest Service Handbook standards will be followed, specifically:

- Chapter 2109.11 for planning projects;
- Chapter 2109.12 for storing, handling, and transporting herbicides and for spill prevention, cleanup, and disposal requirements;

- Chapter 2109.13 for defining worker training and experience requirements; and
- Chapter 6709.11 for identifying worker safety requirements.
- Individual National Forests will provide detailed guidance for large projects.
- Applicator training, testing, and licensing will be required to assure knowledge of herbicide uses, risks, and safety.
- Herbicide safety data sheets will be posted at storage facilities, in vehicles, and made available to workers.
- Skin contact with diesel oil and kerosene will be avoided.

Prescribed Fires: For the use of prescribed fire, extreme care will be taken to:

- avoid excessive consumption of litter and duff;
- reduce fuel consumption on steep and erodible slopes;
- leave unburned buffers of vegetation along streams;
- protect air quality, following all state and local regulations;
- avoid intrusion of smoke into state-identified sensitive areas;
- use the best available technology to reduce smoke;
- (in Oregon) comply with the Oregon State Smoke Management Plan and Implementation Plan;
- (in Washington) comply with the Washington State Smoke Management Plan and Implementation Plan; and
- vegetation treated with herbicides will not be burned for at least one year following treatment.

Unavoidable Adverse Effects

The implementation of any alternative would result in some adverse environmental effects which cannot be avoided. Standards and guidelines from Forest Plans, and mitigation measures developed in the Draft and Final Environmental Impact Statements, are intended to keep the extent and duration of these effects within acceptable levels, but adverse effects cannot be completely eliminated.

This Final EIS examines alternative programs for managing competing and unwanted vegetation, including logging residue. The focus of the environmental analysis here is on how a series of projects conducted over a period of years could affect the environment.

The environmental effects of the alternatives are presented in Chapter IV of the Final Environmental Impact Statement. The effects on the full range of environmental components and conditions are analyzed and presented. The effects on soil, wildlife, fish, timber, scenery, and other aspects are extensively portrayed.

There are three areas of central concern, and these have the potential for significant adverse effects:

- 1) human health risks;
- 2) degradation of air quality from fires; and
- 3) economic effects from changes in timber yields.

Human Health Risks

Human health risks exist for both workers and the public. The risks which workers face from vegetation management activities that were considered in the FEIS include:

- injury from the use of handtools and mechanical equipment in manual control of vegetation;
- illness or injury from exposure to smoke and fire in prescribed burning and wildfire suppression; and
- illness from exposure to herbicides.

Two groups—forest workers and the public—face exposure to herbicides and fire smoke. Worker exposures are far greater in quantity and duration for both herbicides and smoke, which is why worker exposure risks (as a group) are roughly equivalent to the risk to the rest of those affected (the general public).

Health risks to the public can come from accidental exposure to herbicides. Potential routes of exposure to herbicides are discussed in the Final EIS in detail. Greater numbers of people are exposed to smoke from prescribed fires or wildfires.

In addition to risks from herbicides and smoke, workers experience risk from accidents while using equipment and working in rough terrain. The number of predicted accidents is directly correlated with

the number of acres treated by manual means and the number of acres burned.

Air Quality

The amount of smoke produced from both prescribed fires and wild-fires is estimated in the Final Environmental Impact Statement. The section on air quality in Chapter IV displays (for each alternative) the amount of fine particulate emissions expected from the use of prescribed fire.

Alternatives H, F, and D produce significantly less suspended particulates than the rest of the alternatives (except Alternative C). All of the alternatives, when applied on a Regional level, meet the requirements of the Washington and Oregon State Implementation Plans and the requirements of both states' Smoke Management Plans.

Economic Effects

Vegetation management activities can affect the long-term timber yield potential of the National Forests. The Forest planning process may translate these long-term effects into present or future changes in timber yields. This, along with the effects of other factors, can affect the level of economic activity in the Region.

There are a variety of economic effects associated with each alternative. One measure is the combined change in direct and indirect jobs in the Pacific Northwest. (Jobs as used in this analysis include both full- and part-time, temporary and permanent positions, without distinction.)

The effect of Alternative H on job opportunities is approximately 2 percent less, or about 500 positions. Alternative G shows an apparent 2 percent increase, and Alternative B would have no effect on the total annual employment.

The five other alternatives estimate a decrease greater than Alternative H in jobs over the coming decade. The total employment in Oregon and Washington is approximately three million.

Activity, Risk, and Benefits

Health risks to the public at large are roughly correlated with the overall level of vegetation management activity. The level of vegetation management activity also roughly correlates with the levels of economic productivity.

Other Adverse Effects

There is a potential for additional adverse effects beyond those described above. The following effects are not expected to be significant, as standards and guidelines and mitigating measures in the Forest Plans will be in effect, as well as the mitigating measures identified in the Final Environmental Impact Statement.

The additional adverse effects are usually minor, localized, and temporary. They include:

- a short-term reduction in air quality from dust, smoke, and engine emissions resulting from vegetation management activities (other than prescribed burning);
- a localized reduction in long-term site productivity from burning of logging slash;
- the acceleration of natural rates of land slides and sediment by soil-disturbing activities associated with the use of heavy equipment for vegetation management projects;
- a temporary increase in fire hazard from waste material left on the ground during vegetation management activities;
- the contamination of water sources due to increased human use of the Forest;
- a decrease in habitat for wildlife species (dependent on particular plant species and growth stages) due to vegetation management activities; and
- damage to soils by compaction from heavy equipment used for vegetation management.

Again, these effects are likely to be minor and short-lived. But if mitigation measures fail, these effects could be significant on a given site where they occur.

Conclusion

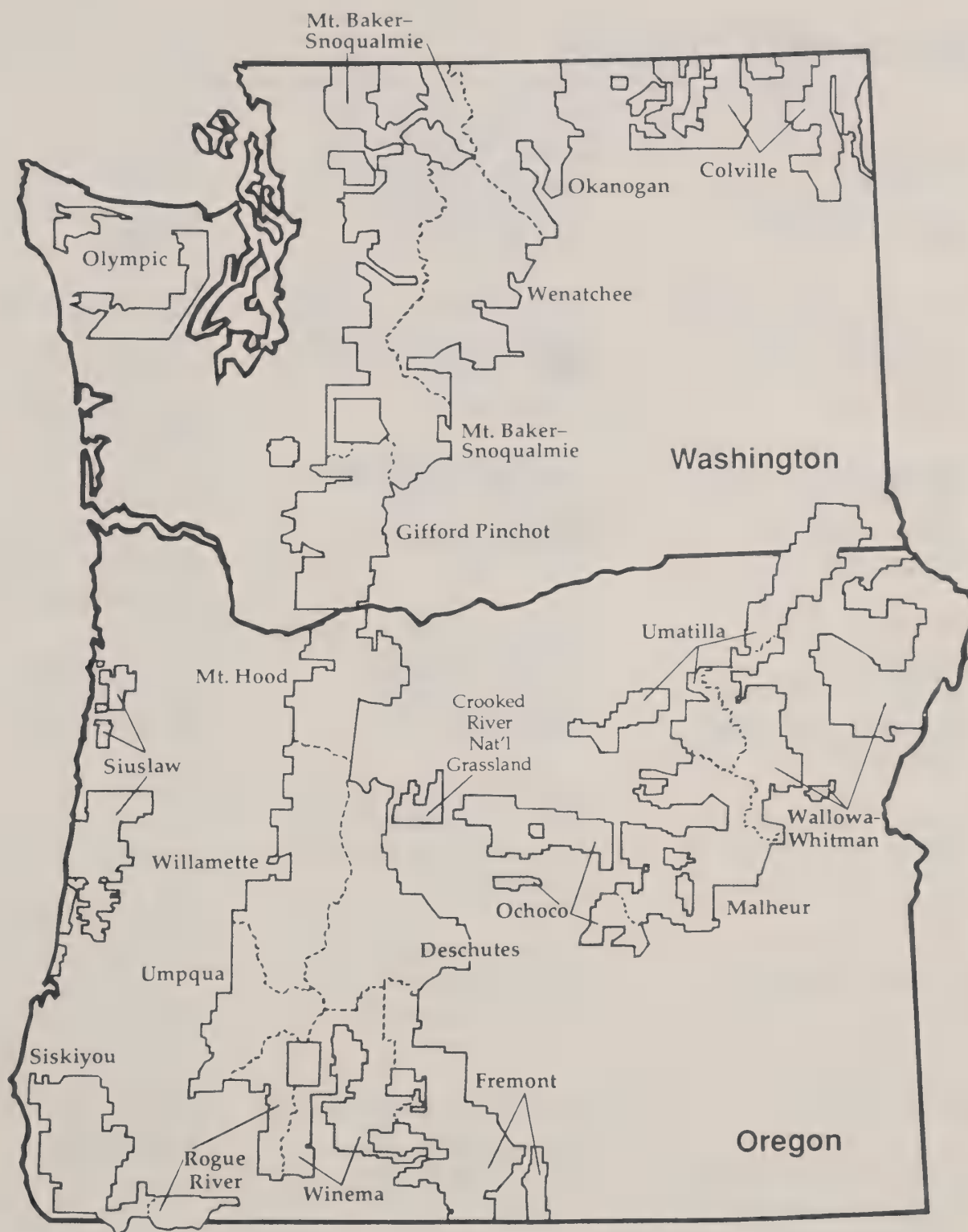
The publication of a Final Environmental Impact Statement concludes the second phase of the vegetation management program. After the Regional Forester selects the alternative that will guide vegetation management activities, the next step is implementation and monitoring. Continued public involvement is key to the success of this project.

This summary of the Final Environmental Impact Statement outlines the vegetation management program, the issues, and the proposed and recommended alternatives. It also provides an overview of the environmental effects of those alternatives. Specific details of these elements are found in the Final Environmental Impact Statement and Appendices, available from the Regional Office (in Portland) or from the headquarters of each National Forest in the Pacific Northwest Region.

If you have a question or comment concerning vegetation management now or in the future, please contact:

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